FASTENING PIN

TECHNICAL FIELD

The object of the invention is a fixture fastening pin, particularly for attaching fixtures to floors, walls, or similar objects, by insertion into pre-drilled holes. This pin is particularly suitable for fixing threshold cover strips.

BACKGROUND ART

Commonly known and applied pins for fastening into walls mostly consist of two parts, where one part is made mainly from plastic and is expanded in the pre-drilled hole by another insertion, usually a metal screw. In many cases such a solution is not satisfactory.

Also is known an anchoring pin, e.g. as per the description of the Polish Patent No. 176358, with insertions positively locked into a hole by means of a bonding mixture which completely fills the clearance between the hole and the pin, being anchored by filling grooves at intervals along the length of the anchoring pin.

From the description of the European Patent No. EP 0588734 is known a threshold strip being in the form of a longitudinal profile of a uniform cross-section that includes a keyway to accommodate a nail head or the head of another type of fixing pin. The abovementioned strip may have a curved top surface and the concave underside of its longitudinal surface determines the alignment of the nail in the guide and allows some variability when fastening the threshold strip onto adjoining base surfaces of unequal height.

From US 5,800,109 a fastener comprises head fins and a shaft. The shaft comprises a tapered section and an untapered section.

From US 5,306,098 a one-piece plastic drive fastener comprises an enlarged head with a rigid cylindrical shank extending therefrom and terminating in a free end. Four circumferentially spaced axial rows of wing elements extend generally radially outwardly from the shank. The wing elements each have the shape of a segment of a thin walled

truncated cone with a narrow first end joined to the cylindrical shank and a wider second end spaced outwardly of the shank and inclined toward the head portion.

From US 4,381,633, the fastener is of non-corrosive plastic construction having a plurality of angled resiliently-deformable teeth which, when inserted through a hole in the shutter into a mounting hole formed in a building wall, tend to flex in the direction of insertion and tend to return to their original position to resist removal.

From US 4,395,174 a fastener for anchoring a sheet-metal roofing panel to the top horizontal web of a roof-supporting sheet-metal beam, comprises a headed shank having an enlarged tip end constructed to penetrate said roofing panel and the underlying web of the panel's supporting beam, by being either percussively driven or rotatingly bored therethrough.

From US 5,907,891, fastener includes a longitudinal shank of generally H-shaped cross section. The H-shaped cross section is formed of opposed lateral sides and longitudinal cross member. Additionally, opposed lateral sides are spaced by transverse supports. The outer ends of opposed lateral sides respectively, are coextensive with a portion of the circumference of the circular base of conical head.

AIM OF THE INVENTION

The purpose of the present invention is to develop a fastening pin which does not require the application of mortar or another bonding mixture and avoids, or at least greatly diminishes, the disadvantages known from prior art.

DISCLOSURE OF THE INVENTION

The present invention relates to a pin, which is provided with elastic protrusions, ideally spade-shaped and which are moulded around the longitudinal axis of the pin, providing a free overall external diameter greater than the diameter of the pre-drilled hole and thereby being an interference fit producing a self-locking effect.

It is desirable that the spade-shaped protrusions are arranged at a slightly acute angle to the pin's longitudinal axis, pointing towards its head. Such an arrangement of the protrusions allows the ready insertion of the pin into the hole, provides positive self-locking in the pre-drilled hole and at the same time effectively prevents it being easily withdrawn.

The proposed solution is one in which the protrusions are flexible and are in the shape of narrowly-tapered truncated pyramids with rectangular bases (spade-shaped

protrusions). Such protrusions may have narrow highly flexible outer tips which allow them to come into intimate contact with the walls of the hole.

Also envisaged is a solution in which the spade-shaped protrusions are arranged radially over a cross-sectional area allowing them to be deflected upwards as the pin is inserted into the a hole with varying degrees of force. This solution may also include protrusions of unequal height and where the different heights of the protrusions may be produced both around the pin's diameter and along its length. When manufacturing pins with different cross-sections and lengths it is advantageous that shorter pins should have protrusions with larger cross-section and individual width.

In alternative solutions protrusions may be made of different materials than the central pin material and the protrusions may be in the form of rods, preferably made of steel. There is also the alternative possibility for the pin's core to be made from steel and the protrusions from plastic.

An integral part of the solution is also the top of the pin, especially when designed for threshold strips, when the head is located in a keyway formed in the under surface of the strip, and designed in such a way that the pin has a neck between the anchored part and its head.

Preferably, the neck should have a cross-section with a narrowing or constriction, possibly shaped as a circumferential groove on the neck. In such a case the pin's neck should be cylindrical, because the narrowing allows the pin to flex at that point. The neck's constriction may also be in the form of an indentation or indentations, preferably positioned symmetrically and at right angles to the pin's longitudinal axis.

The invention also envisages a fastening pin in which the neck has a flat form having an asymmetrical longitudinal axis and having with bends with grooves at their points of maximum curvature to allow the pin flex in a pre-determined place. This provides a springing effect.

Also envisaged is a pin in which the flexing function is performed by a solution in which the lower section of the pin is made of a material more flexible than the material of which the head is made. The flexible material allows the neck to flex.

In another solution the joint is of a hinge form, in which the pin's head has forked arms between which the top end of the neck, suitably shaped, is attached with a dowel.

An essential feature of the invention is that the lower two-thirds, constituting the main shank of the pin has elastic protrusions, preferably spade-shaped, as described earlier, that are moulded around the pin's longitudinal axis. Ideally these protrusions

should be slightly inclined towards the head of the pin. The upper part of the pin between the main shank and the neck is provided with tapering longitudinal splines symmetrically set around the core of the pin. The taper narrows towards the lower and (main shank) of the pin and provides for positive alignment in the pre-drilled hole. The section immediately above this has a designed constriction to allow the head of the pin to flex and thereby to compensate for any drilling errors or unequal heights in the adjoining finishing layers to be covered by the threshold strip.

The solution proposed in the invention also allows the pin to be firmly located into the vertical surface of a wall without using bonding materials or secondary inserts to make the fitting expand (such as metal screws). The elastic protrusions, bending in response to small forces, allow the easy insertion of the pin into a hole without using special tools, holding it firmly in place thereby preventing both rotation and easy withdrawal. If a permanent, very high-strength fitting is necessary, the invention does not preclude the use of a setting material to fill the spaces between the protrusions and the sides of the hole.

The solution provided by the invention provides an easy and highly convenient method for fastening threshold strips onto floor sills of different adjoining heights and also the bridging with similar strips of other parts, however unevenly aligned.

The pin, being fitted with tapered splines, protects the pin's protrusions from lateral stresses, these being absorbed by the splines positively locating the pin centrally in the hole. The high contact area of the splines with the outward end of the hole as opposed to the minor but multiple contact surfaces of the spade-shaped protrusions tends to inhibit any chipping of the hole's edges and makes the pin able to resist high shear stresses. The tapering of the splines towards the lower/inner end of the pin permits the easy insertion of the latter the hole and compensates for any drilling inaccuracies which often occur when drilling base material containing inhomogenous particles, such as lumps of aggregate in concrete. By providing the pins with flexing necks it is possible to fasten threshold strips to cover adjoining floor-coverings of uneven height and compensate for any longitudinal unevenness.

BRIEF DESCRIPTION OF THE DRAWINGS

The object of this invention is shown in implementation examples in the enclosed drawings, in which:

Fig. 1 shows a perspective view of a pin;

Fig. 2 shows an enlarged detail of the pin shown in Fig. 1;

Fig. 3 shows a view of a pin in place in a pre-drilled hole and a fastening strip covering the floor's expansion gap;

Fig. 4 shows a perspective view of a pin with a head having a 'T' profile;

Fig. 5 shows a side elevation view of the pin shown in Fig. 4;

Fig. 6 shows a perspective view of a round-headed pin with a narrowing on a neck;

Fig. 7 shows a side elevation view of the pin shown in Fig. 6;

Fig. 8 shows a perspective view of a pin with twin indentations on opposite sides of a neck and a square head;

Fig. 9 shows a side elevation view of the pin shown in Fig. 8;

Fig. 10 shows a perspective view of a pin with a square head and a neck in the shape of a double-offset flat bar with a thinner section at each offset;

Fig. 11 shows a side elevation view of the pin shown in Fig. 10;

Fig. 12 shows a perspective view of a pin with a hinged head;

Fig. 13 shows a side elevation view of the pin shown in Fig. 12;

Fig. 14 shows a perspective view of a pin with a transverse rectangular hole across a neck;

Fig. 15 shows a side elevation view of the pin shown in Fig. 14;

Fig. 16 shows an example of a pin used to fasten a threshold-strip on two adjoining base surfaces of unequal height;

Fig. 17 shows a perspective view of a T-headed pin with its various cross sections;

Fig. 18 shows an enlarged detail of the pin shown in Fig. 17;

Fig. 19 shows a side elevation view of a pin with a 'T' head;

Fig. 20 shows a front elevation view of the pin shown in Fig. 19; and

Fig. 21 shows a cross-sectional view of a pin in place in a pre-drilled hole.

BEST MODE FOR CARRYING OUT THE INVENTION

The best mode for carrying out the invention will be presented according to the accompanying set of drawings where the novel shape of the pin will be presented.

A pin 1, shown in Figs. 1, 2 and 3, is equipped with flexible protrusions 2 that are tapered towards their tips and circumferentially distributed along the longitudinal axis of the shank, especially in the shape of narrowly-tapered truncated pyramids with a rectangular base (spade-shaped protrusions). The protrusion axis of the symmetry is situated in the plane of the symmetry of the shank. The protrusions 2 are situated at an acute angle on the pin's longitudinal axis, inclined slightly towards its head. Individual

rows of protrusions are circumferentially distributed along the pin's longitudinal axis. When inserting the pin into the hole 3 the protrusions 2 are deflected upwards. Contact with and pressure against the hole's walls provides a self-locking effect and prevents withdrawal or rotation of the pin. The fastening pin is fitted with a head 4 which locates in the threshold strip's underside keyway. The head and neck of the pin may be of various designs as shown in Figs 4 and 5, but all are designed to flex or swing in the neck area by means of a thinner section or smaller cross-sectional area at that point.

In the solution illustrated in Figs. 6 and 7 the narrowing is in the form of a groove 9 round the whole circumference of the shoulder, and the head 4 is cylindrical. This solution allows the pin to flex on its longitudinal axis.

In the design presented in Figs. 8 and 9 the shoulder has two indentations on opposite sides of the neck. The position of these grooves may lie at any position on the neck relative to the head of the pin.

In Figs. 10 and 11 the pin has a neck in the shape of a double-offset flat bar 11 with a thinner section 12 at each offset to allow for a spring effect at this point.

In the solution presented in Figs. 12 and 13 the joint is in the form of a hinge. Between fork like protrusions 13 under the head, the neck has a cross-drilled upper end the two parts being connected by a dowel 14, allowing the head to move through an arc.

The flexing function is also achieved in the solution presented in Figs. 14 and 15. A cross-sectional reduction, allowing the pin to bend at that point is provided by hole 15 in the neck.

Fig. 17 shows a pin equipped with spade-shaped flexible protrusions 2, moulded round its longitudinal axis for ca. 2/3 of the lower end of the pin. The part of the pin near the head 4 contains radially set tapered alignment splines 16, which have seen side-on have a near-trapezoidal section. These radially set tapered alignment splines 16 are arranged symmetrically round the central body or shank 7. By being wider towards the head of the pin they permit the upper end of the pin to be aligned centrally in the pre-drilled hole and over-ride any faults caused by the drilling process, such as structural damage to the solid matrix or slight chipping of the edges of the hole.

Fig. 21 shows a cross-section of a surfaced matrix floor with a typical pin holding a threshold strip 5 in place. After pre-drilling holes 17, the heads of the pins are slid into the keyway on the underside of the threshold strip 5. The pins may then be slid along the keyway to align with the holes and gently and progressively knocked into place by tapping the top surface of the threshold strip with a soft-headed mallet. Due to the interference fit

in the holes the spade-shaped protrusions 2 will be deflected upwards to provide a self-locking effect. As the pin reaches its final depth the splines 16 engage positively with the upper walls of the hole 17, providing a positive location. Any misalignment of the row of holes or uneven heights of the adjoining surfaces is compensated by flexing of the neck of the pin at its constriction or in the case of the type of head-joint in Figs. 12, 13 by the head moving physically about the pivot. If the base surface is uneven along the direction of the threshold strip use of the neck type shown in Figs 10 ,11 will allow the threshold strip itself to be slightly deflected longitudinally, being held in place by the spring-tension in the necks of the pins.